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Macro studio student projects

School of Architecture, Art and Historic Preservation, Roger Williams University

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THE CENTER FOR MACRO PROJECTS AND DIPLOMACY
ROGER WILLIAMS UNIVERSITY

WORKING PAPER SERIES

VOLUME TWO : SPRING 2004

NEW LAND FOR PEACE: CONSTRUCTING PROSPERITY IN THE MIDDLE EAST

MACRO STUDIO STUDENT PROJECTS

The Center for Macro Projects and Diplomacy was established at the First Macro Conference held at Roger Williams University, Bristol, Rhode Island in April 2004.

The Center fosters the interdisciplinary formulation, study, demonstration and debate of ideas contributing to human progress through the improvement of world habitat. In the increasingly globalized world, solutions to problems require a broad approach that considers an array of concerns--cultural, environmental, technical, economic, social, political and legal--as well as the communication and negotiation skills necessary to achieve agreement. Many current proposals or projects fail because they are conceived in isolation or consider relationships narrowly. With invited leaders, faculty and students concentrating on clearly-defined issues of importance to the world community— land, water, energy and food supplies; transportation, environmental quality, housing, education, health care, heritage--the Center follows through on steps needed to design, display, debate, evaluate, test, and in appropriate cases, deploy undertakings of relevance and urgency.

Current activities of the Center include:

- organization of an annual conference on selected themes involving large scale projects and their potential for positive diplomatic impact,
- publication of the annual *Journal of Macro Projects and Diplomacy*, that acts as a forum for exchange of ideas and a means to disseminate information and report research activities. The *Journal for Macro Projects and Diplomacy* is available from Roger Williams University, Bristol, Rhode Island.
- development of Preliminary Project Proposals for consideration by investors and government for implementation.
- publication of Occasional Papers by leaders in the field on selected large scale projects with urgent implications

MACRO PROJECTS WORKING PAPERS SERIES

The Center also publishes the Macro Project Working Paper Series. All Working Papers are the product of faculty and student research at Roger Williams University that address an annual conference theme. Papers have been grouped by subject such as international relations, architecture and planning, engineering, management, law and finance.

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New Land for Peace: Constructing Prosperity in the Middle East

The Inaugural Conference of the Center for Macro Projects and Diplomacy
at Roger Williams University, Bristol, Rhode Island.

VOLUME TWO: SPRING 2004

MACRO STUDIO STUDENT PROJECTS

CONTENTS

Project Participants	2
Project Description	3
Project Locations	4
1. Egypt Gaza Interface	5
2. Tel Aviv Coastal Islands	9
3. Vernacular Kahn Younis	13
4. Peninsula with Port off Gaza	17
5. Linear Island with Port	21
6. Marina Cove Islands near Wadi, Gaza	25
7. Desert Settlements/Desert City	29
Appendices	36
Conditions and Standards	37
Climate	38
Power	38
Cargo Shipping	39
Airport Facilities	39
Water	40

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Student Teams:

1. Egypt Gaza Interface

Jeffrey Massey
Sean Schmigle

2. Tel-Aviv Coastal Islands

Stefanie Balzotti
Robert Larson
Dennis Morelli
Vincent Sorrentino

3. Vernacular Kahn Younis

Michael Gersht
Christopher Nardi
Akta Patel
Martina Ruhfass

4. Peninsula with Port off Gaza

William Bartell
John Masson
Sean Schmigle
Joshua Vacca

5. Linear Island with Port

Tibor Martin
Aaron Opalka
Samuel Ruberti
Benjamin Zoghbi

6. Marina Cove Islands near Wadi, Gaza

Amy Hutchins
Jeffrey Massey
Kevin Morin

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Director, The Center for Macro Projects and Diplomacy

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Timothy Ganetis
Kathleen Murtagh

Roger Williams University School of Architecture, Art and Historic Preservation**The Macro Studio*****Land for Peace: The Architecture of New Communities on Reclaimed Land in the Mediterranean Sea*****Professors Charles Hagenah and Patrick Charles****Spring 2004**

This studio explores the architectural implications of designing and building new settlements on reclaimed land from the sea and the desert near Israel and the Gaza Strip, as one element of a possible solution to the ongoing unrest between Israelis and Palestinians. Studio members will be involved in designing landforms, master planning, and extensive architectural design of interrelated components of a vital settlement design, inclusive of housing, recreational, commercial and institutional elements. That there are no technical barriers to such a program has been confirmed by competent preliminary studies over a period of recent years involving new agriculture, and by the notable examples of major reclamation and urban design projects around the world over centuries—in San Francisco Bay, Boston Back Bay, the Netherlands, Leningrad, Bombay, Singapore, and Japan to name but a few examples.

The work of the studio is conceived as one element of a major new peace initiative for the Middle East originating from several leaders in conjunction with Roger Williams University, and will be a featured element of an international “Land for Peace Summit” to be held here on April 15-16, 2004. The Summit will be composed of public presentations and design studio review sessions among world leaders, scholars, designers, faculty and students convened over the two-day period. A key goal of the April Summit is to display the potentials large-scale constructive projects could offer toward solution to issues of world concern, in this case the Middle East crisis.

This Summit and Studio are first steps toward establishing a new Roger Williams University Center for Macro Projects and Diplomacy, to be announced in late January 2004. The studio work is thus an endeavor of the highest seriousness toward framing an actual proposal that could be developable through to construction. Given the scope of the work involved, the studio is conceived for 24 students, and will be team taught by two faculty, Professors Charles Hagenah and Patrick Charles, with additional input from Dean Stephen White, who with RWU President Roy J. Nirschel is centrally involved in establishing the Center. Additional support and research will be framed with Associate Dean Okan Ustunkok, and RWU Master of Architecture graduate assistants Jason Carr, Timothy Ganetis, and Kathleen Murtagh. The studio will be fast paced, and demanding of the highest effort from all involved, including the creation of high quality models, drawings and animations/films. Proceedings of the Land for Peace Summit, including the work of the studio, are expected to be released in the first issue of a new annual RWU publication, projected for Fall 2004.

To date, confirmed participants at the Land For Peace Summit include Frank P. Davidson, Founding Advisor of the RWU Center for Macro Projects and Diplomacy, and a driving force behind the development of the English Channel Tunnel linking England and France; Dame Margaret Anstee, Under-Secretary General of the United Nations (retired); William P. Carey of the W. P. Carey Company, New York, inventor of the real estate investment trust; Uwe Kitzinger, Founding President, Templeton College, Oxford University; world renowned MIT economist Lester Thurow; ocean engineer Ernst Frankel, whose work includes consultancies for the Panama Canal Company, and in Spain, China, and Singapore; and architect Suha Ozkan, Secretary-General of the Aga Khan Awards Program, Geneva.

The participation of RWU President Nirschel, Dean David Logan of the RWU Pappito School of Law, and Professor of International Relations Mark Sawoski is expected. Participation by varied architectural and “envisioning” leaders including leaders of the local architectural community is also expected. Mr. Davidson and Mr. Frankel in particular will be available to inform and critique the work of the studio throughout the semester.

The Macro Studio is about framing and achieving a vision that can improve human prospects in a region that is at the center of world culture and of current conflict; undertaking this multifaceted endeavor in collaboration with important leaders from many fields. We are seeking to confirm the academic world’s and the design professions’ ability to play a significant role in this process.



Seven Design Locations : Israel, Gaza Strip, Egypt

1. Egypt Gaza Interface
2. Tel Aviv Coastal Islands
3. Vernacular Kahn Younis
4. Peninsula with Port
5. Linear Island with Port
6. Marina Cove Islands near Wadi
7. Desert Settlements/Desert City



1. Egypt Gaza Interface

Jeffrey Massey
Sean Schmigle

**1**

Egypt/Gaza Interface, Egypt

Area:

2.8 km²

1.08 mi²

Probable population:

55,000 inhabitants

11,000 units

1 Egypt\Gaza Interface, Egypt

Located off the coast and in Egypt near the Rafah border, this scheme investigates the possibility of land reclamation and development of existing coastal land in Egypt. Currently this site has some structures and only minimum infrastructure. This approach begins with a floating island deep water cargo facility in international waters with some integrated assembly and light manufacturing activities to provide work opportunities. With Arab administration and provided security, growth potential and investment may be more assured. A constructed causeway connects to the cargo and shipping center as the existing Infrastructure on the mainland is expanded.

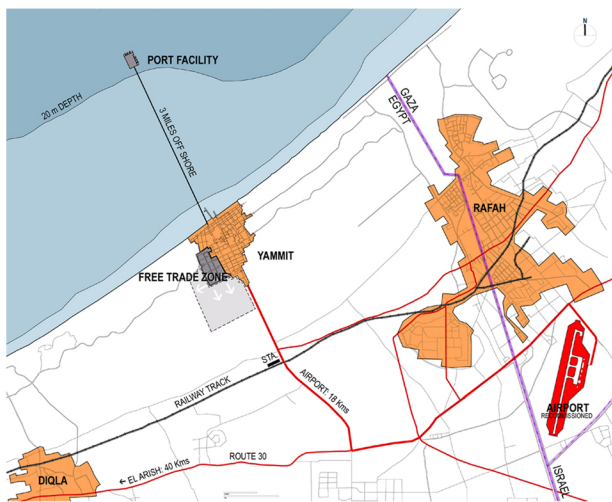
A Free Trade Zone is proposed as a catalyst for economic opportunity and growth. Potential workers for these new facilities come from Egypt or Palestinians from the Gaza Strip. Airport facilities that originally existed within the Gaza Strip are reconstructed and expanded for use with new manufacturing buildings and contemporary airport structures.

Ideas for the political realization of this scheme explore future land purchases between Egypt and Palestine, shared international development opportunities and a joint International Palestinian/Egyptian Free Trade Zone.

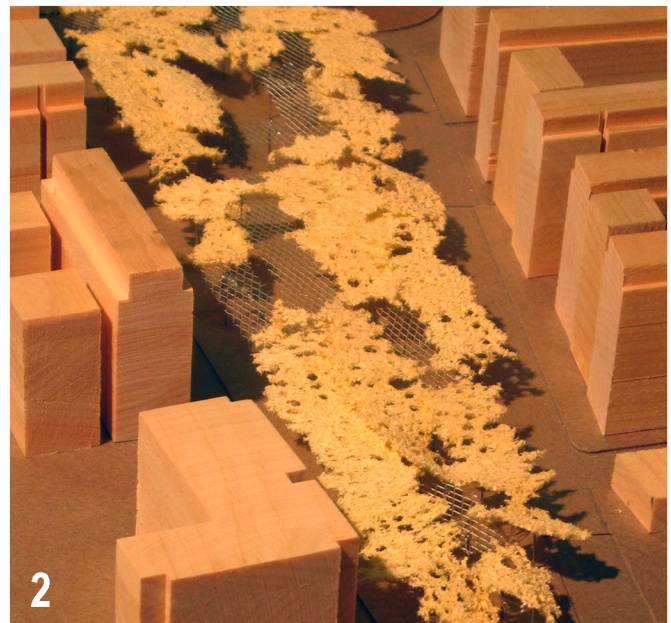


Area:
2.8 km²
1.08 mi²
Probable population:
55,000 inhabitants
11,000 units

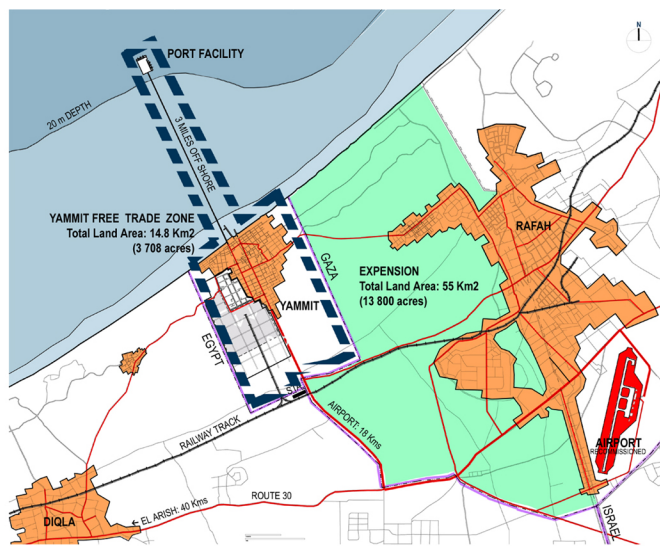




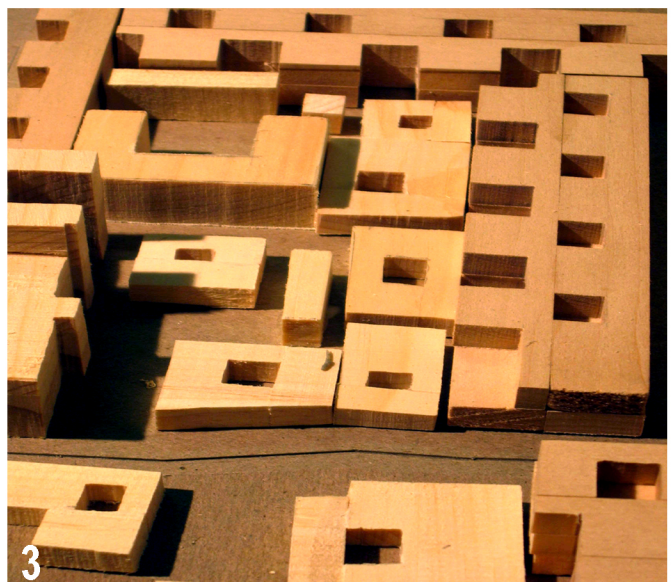
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2



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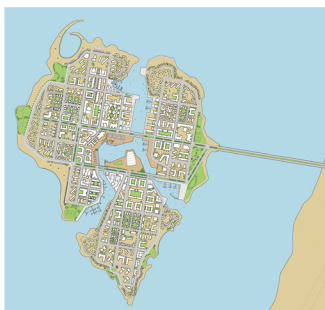


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1

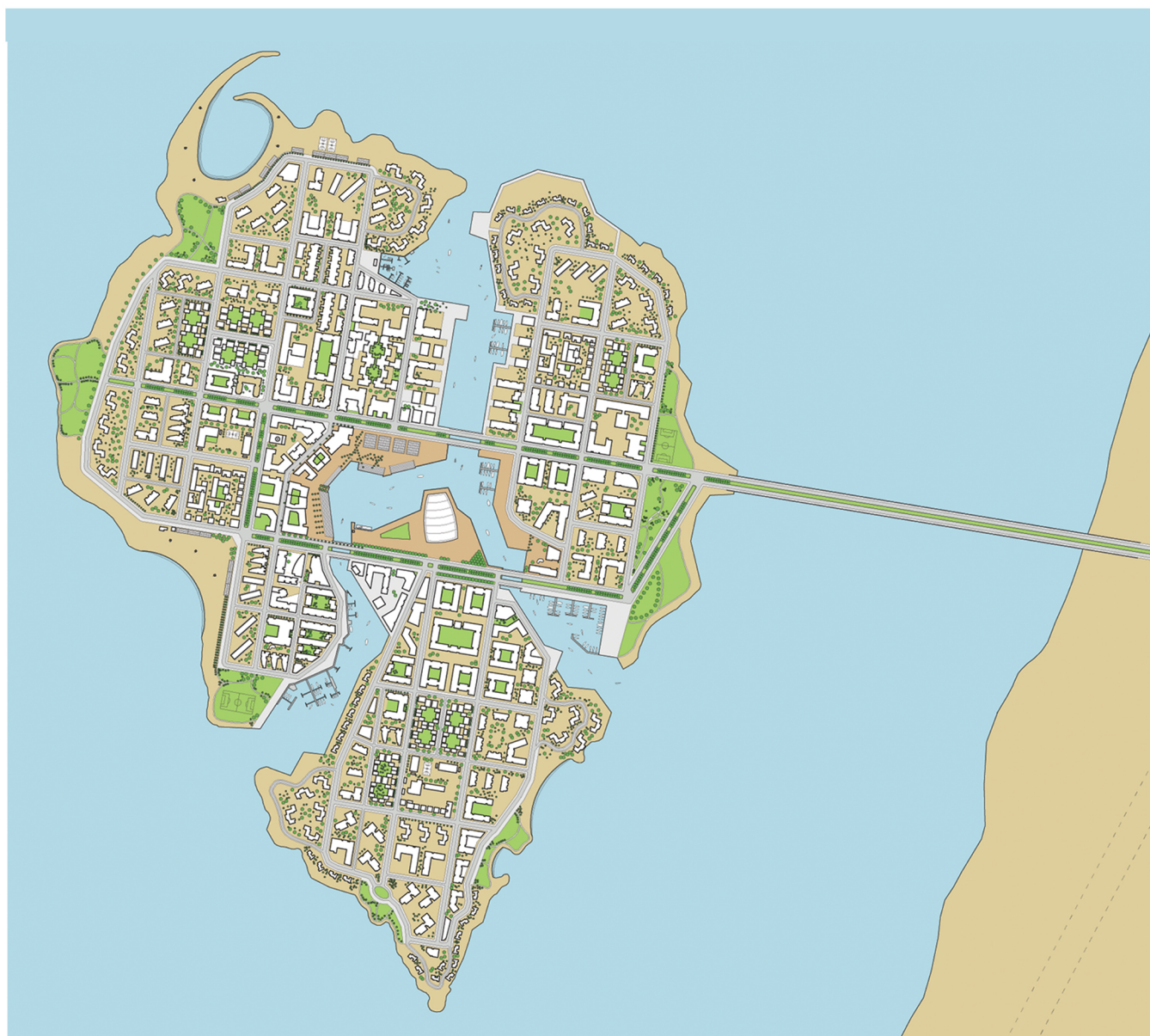
Egypt/Gaza Interface, Egypt

- 1 Egypt/Gaza Interface context
- 2 Shaded major public space
- 3 Articulation of domestic scale
- 4 Egypt/Gaza Interface expansion scheme



2. Tel-Aviv Coastal Islands

Stefanie Balzotti
Robert Larson
Dennis Morelli
Vincent Sorrentino

**2****Tel Aviv Coastal
Island, Israel**

New Land reclaimed:

1.5 km².5 mi²

Probable population:

30,000 inhabitants

6,000

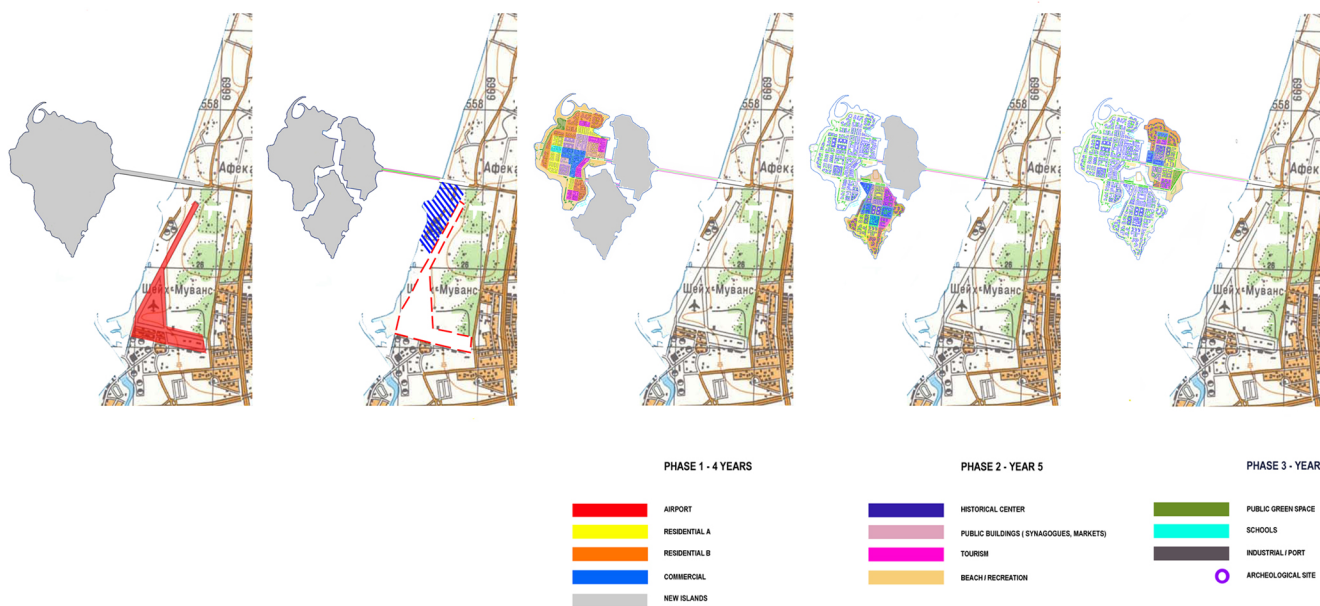
2 Tel Aviv Coastal Islands, Israel

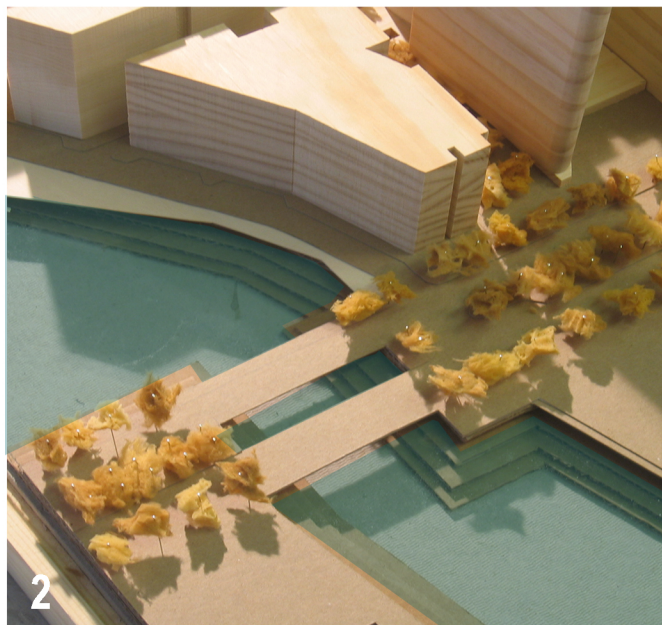
This location and design investigation responds to a higher per capita income of the Israeli population combined with normal population growth and the potential land needed for immigration. It also provides new land for the relocation of Israelis refugees from settlements in the Gaza Strip and the West Bank if that publicized political plan proposal is implemented. The island scheme can be created in phases over time. Upgraded existing airport facilities will be expanded near Tel Aviv.

With other deep sea ports available in Israel, no new Container ship or Cargo facilities are required here. New land is provided for special housing on islands that serve the tourist industry. Anticipated here are a range of facilities including hotels, popular waterfront development, cafes, exclusive shopping streets, beaches, recreation facilities, boating, tour ships. For the inhabitants and new residents, a sense of community is established with local services within walking distances.



New Land reclaimed:
1.5 km²
.5 mi²
Probable population:
30,000 inhabitants
6,000





2

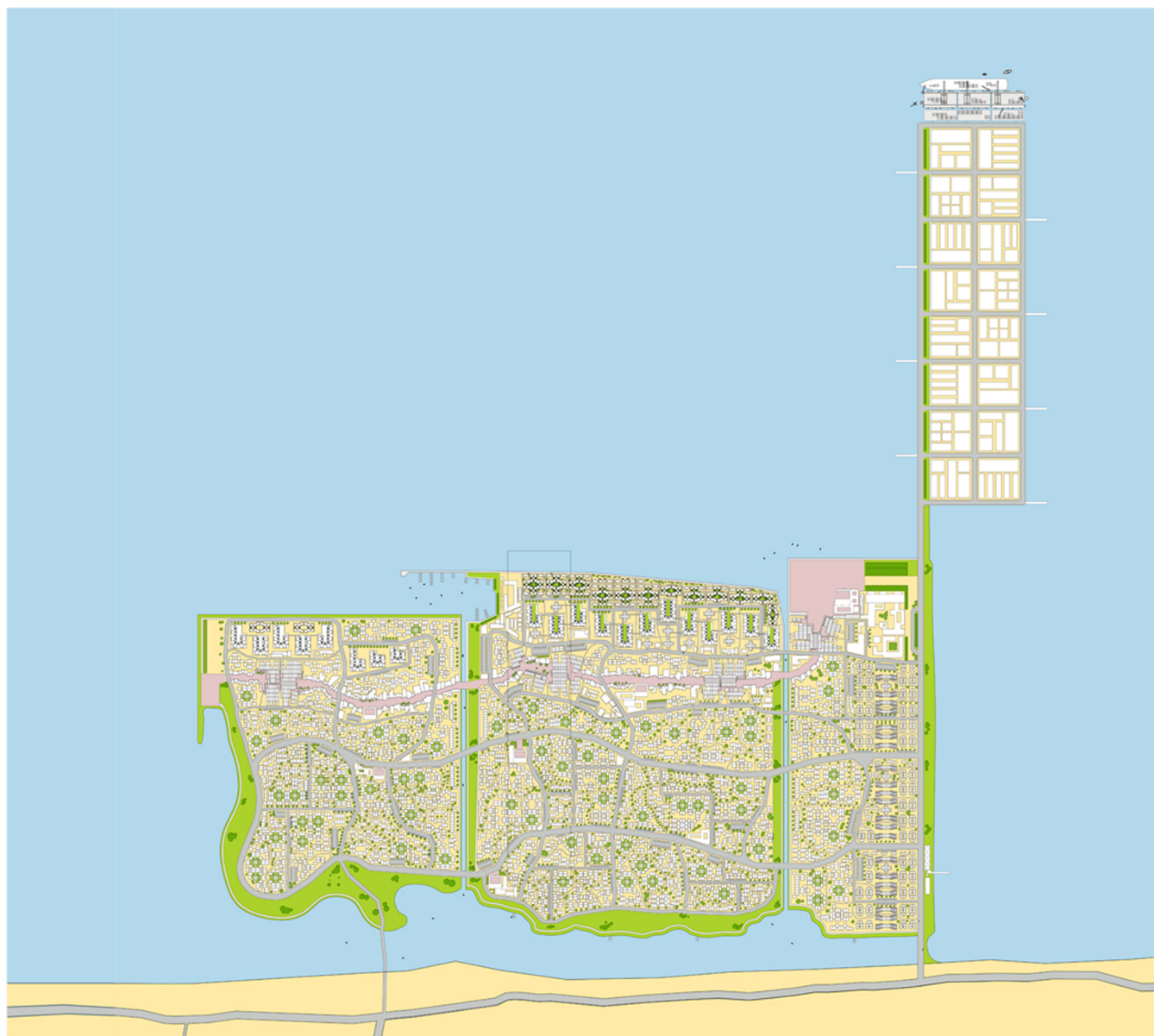
Tel Aviv Coastal Islands

- 1 High-rise housing and urban park and marina
- 2 Interior waterways
- 3 Early urban fabric study - Low and Mid-rise Housing



3. Vernacular Kahn Younis

Michael Gersht
Christopher Nardi
Akta Patel
Martina Ruhfass



3 Vernacular Kahn Yunis, Gaza

New Land reclaimed:
2.1 km²
.8 mi²
Probable population:
40,000 inhabitants
8,000

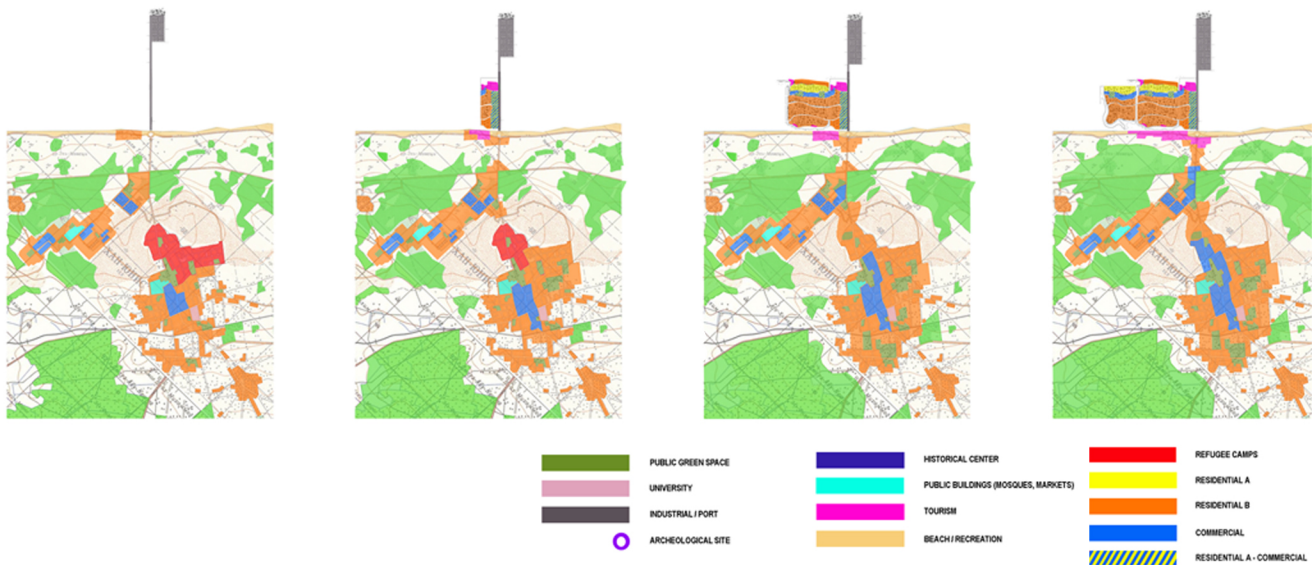
3 Vernacular Kahn Younis

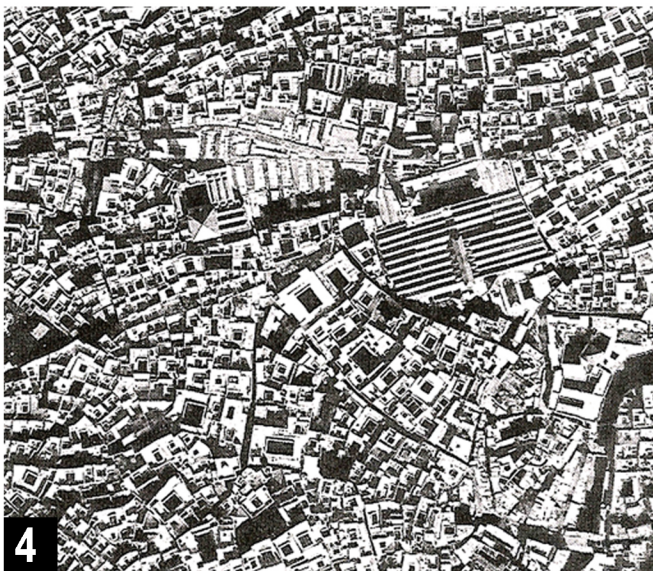
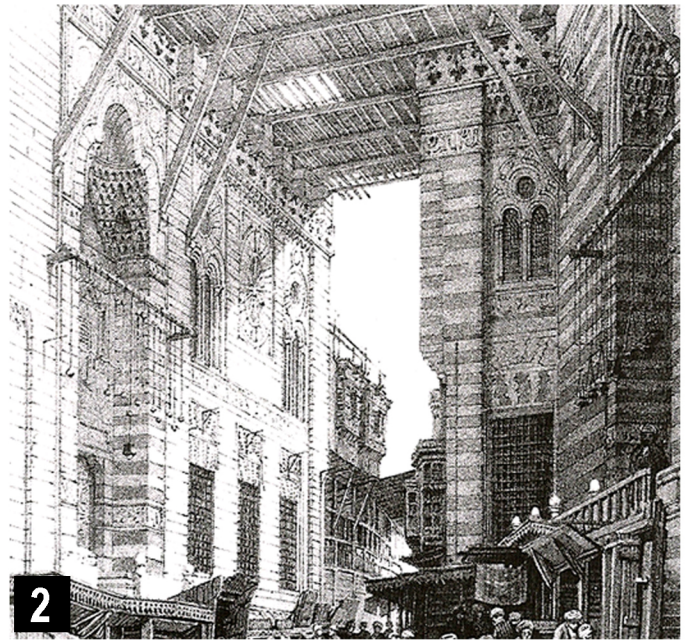
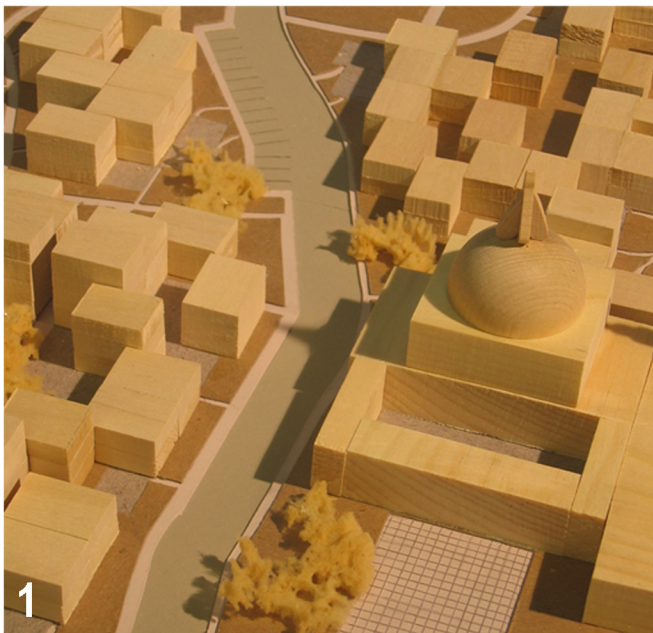
The name assigned to this island development gains its meaning from the language of the master plan and design. Each attempts to bridge contemporary planning and a vernacular architectural language with the culture of the Middle East. This design softens grid systems, responds to lower population densities, celebrates the pedestrian markets with historical references, private courtyards and cultural experience that was inherent in past cities of the region. In doing so it also responds to Climate and Environmental concerns. The overall plan is developed in multiple phases.

With distinctive zones for small neighborhoods, housing, markets, cultural facilities, waterways, pedestrian green areas and open public spaces, its human scale and community is evident. Its intention is a comfortable cultural responsive living environment that is also a plan for 21st century needs. Closer to the mainland than other schemes, filled land would quickly expand through the construction of new housing toward the mainland. Phasing includes mainland growth.



New Land reclaimed:
2.1 km²
.8 mi²
Probable population:
40,000 inhabitants
8,000





3

Vernacular Kahn Yunis, Gaza

- 1 Neighborhood Mosque within urban fabric
- 2 19th century Egyptian covered market street
- 3 Contemporary covered markets with housing above
- 4 Traditional urban fabric with courtyards and street patterns



4. Peninsula with Port off Gaza

William Bartell
John Masson
Sean Schmigle
Joshua Vacca



4

Peninsula Port, Gaza

New Land reclaimed:

1.65 km²

.64 mi²

Probable population:

54,000 inhabitants

10,800 units

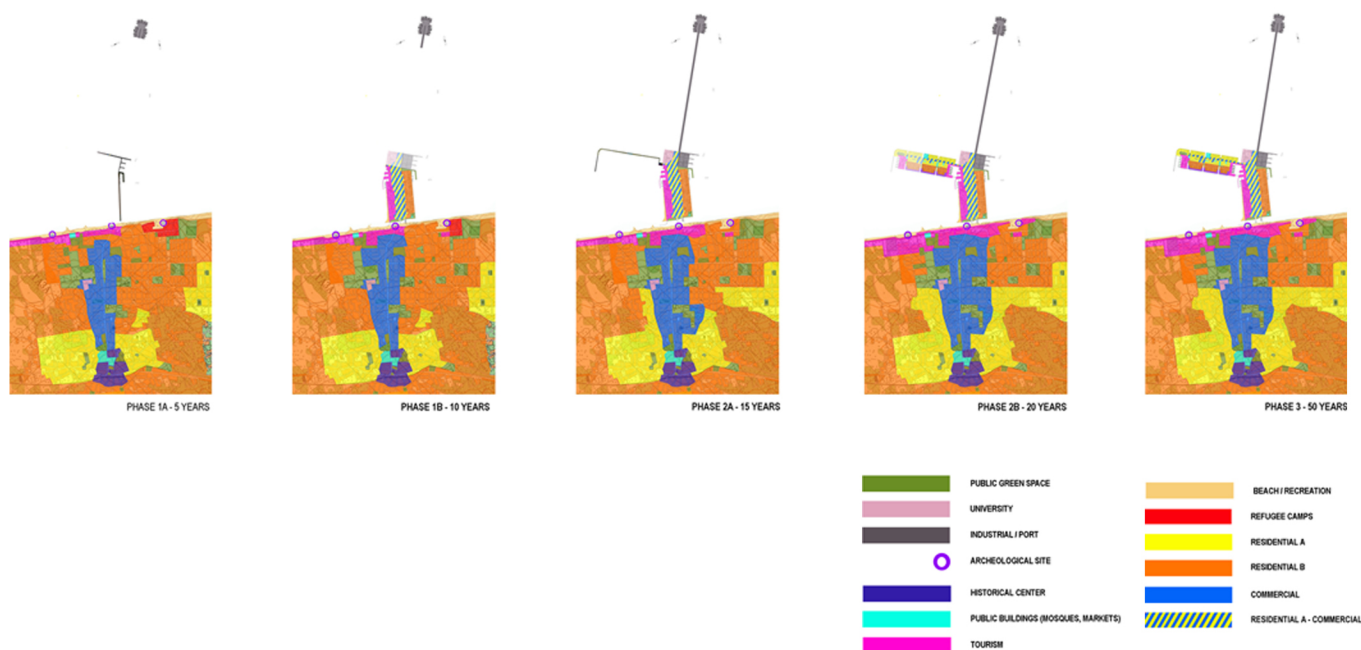
4 Peninsula Port, Gaza

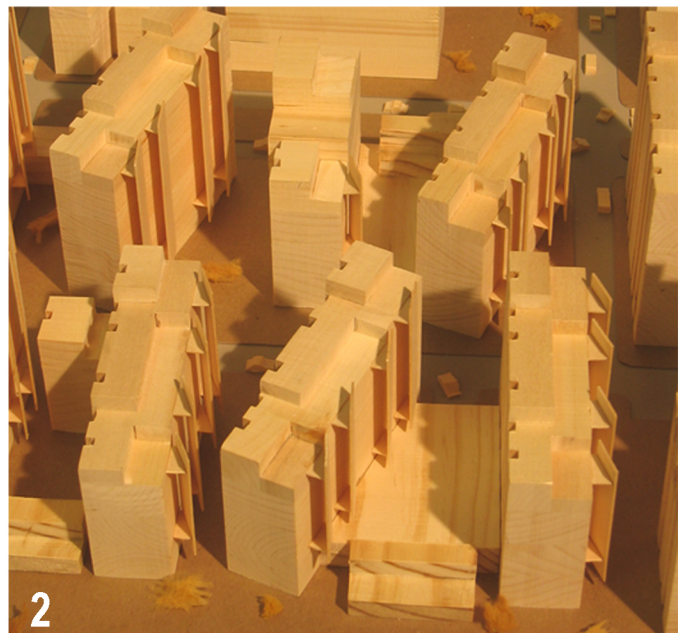
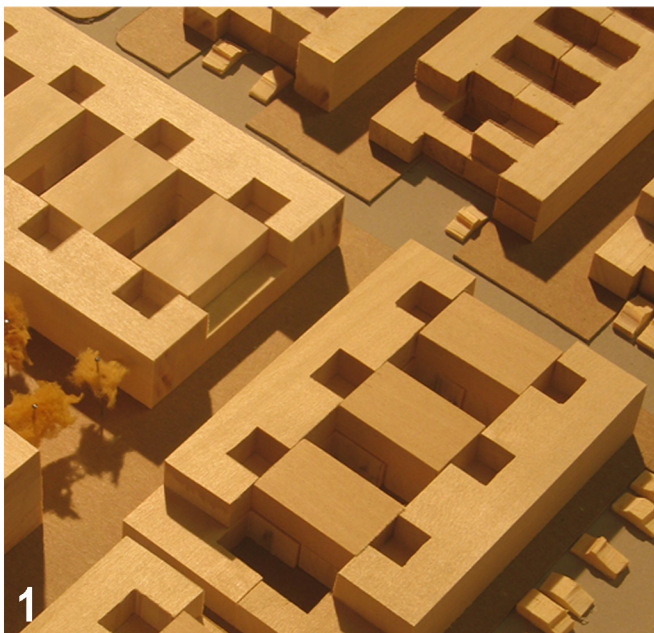
Later phases of growth include additional housing of varied densities, a University campus, local marinas, parks, cultural facilities, and tourism facilities. These phases on filled land allow growth and services to expand toward the mainland. Phasing includes mainland growth and development.

Located off the coast and connected to the Gaza Strip near Gaza, this scheme creates a deep sea port three miles off the coast connected by filled land on which manufacturing and assembly facilities are placed. Housing for workers is included in the early phases.



New Land reclaimed:
1.65 km²
.64 mi²
Probable population:
54,000 inhabitants
10,800 units





4

Peninsula Port, Gaza

- 1 Low-rise courtyard housing blocks
- 2 High-rise coastal housing placed for prevailing wind ventilation and cooling
- 3 Early Urban Fabric Study - Low and Mid-rise Housing
- 4 Main commercial artery



5. Linear Island with Port

Tibor Martin
Aaron Opalka
Samuel Ruberti
Benjamin Zoghbi



5 Linear Island with Port, Gaza

New Land reclaimed:

4 km²

1.5 mi²

Probable population:

60,000 inhabitants

12,000 units

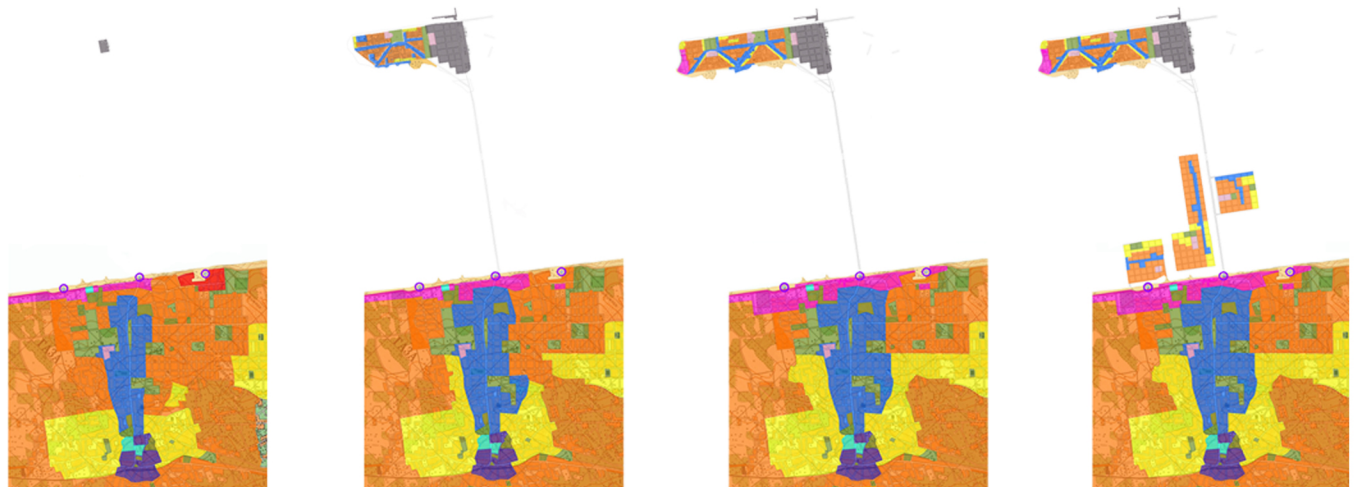
5 Linear Island with Port, Gaza

Initially, this land creation focuses on an isolated floating cargo facility served by ferry service for workers. With continued growth and prosperity, a causeway is constructed and cargo facilities, light industry and manufacturing expand. The initial phase anchors a deep sea port facility able to load and unload container ships with manufacturing and assembly facilities beyond the three mile limit. A Free Trade Zone enhances successful development by allowing opportunities for investment.

Housing needs are provided for. Public spaces create a sense of place; cultural services including mosques and social services complete a small city with a sense of community. Expanding over decades of growth and filled sections of reclaimed land, the island will eventually grow closer to the mainland, separated by only a strip of water. Phasing includes mainland growth.



New Land reclaimed:
4 km²
1.5 mi²
Probable population:
60,000 inhabitants
12,000 units



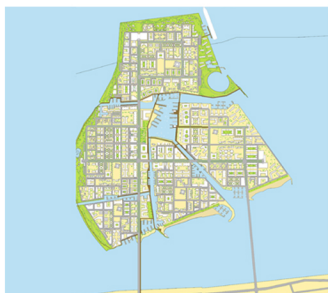
PUBLIC GREEN SPACE	BEACH / RECREATION
UNIVERSITY	REFUGEE CAMPS
INDUSTRIAL / PORT	RESIDENTIAL A
ARCHAEOLOGICAL SITE	RESIDENTIAL B
HISTORICAL CENTER	COMMERCIAL
PUBLIC BUILDINGS (MOSQUES, MARKETS)	RESIDENTIAL A - COMMERCIAL
TOURISM	





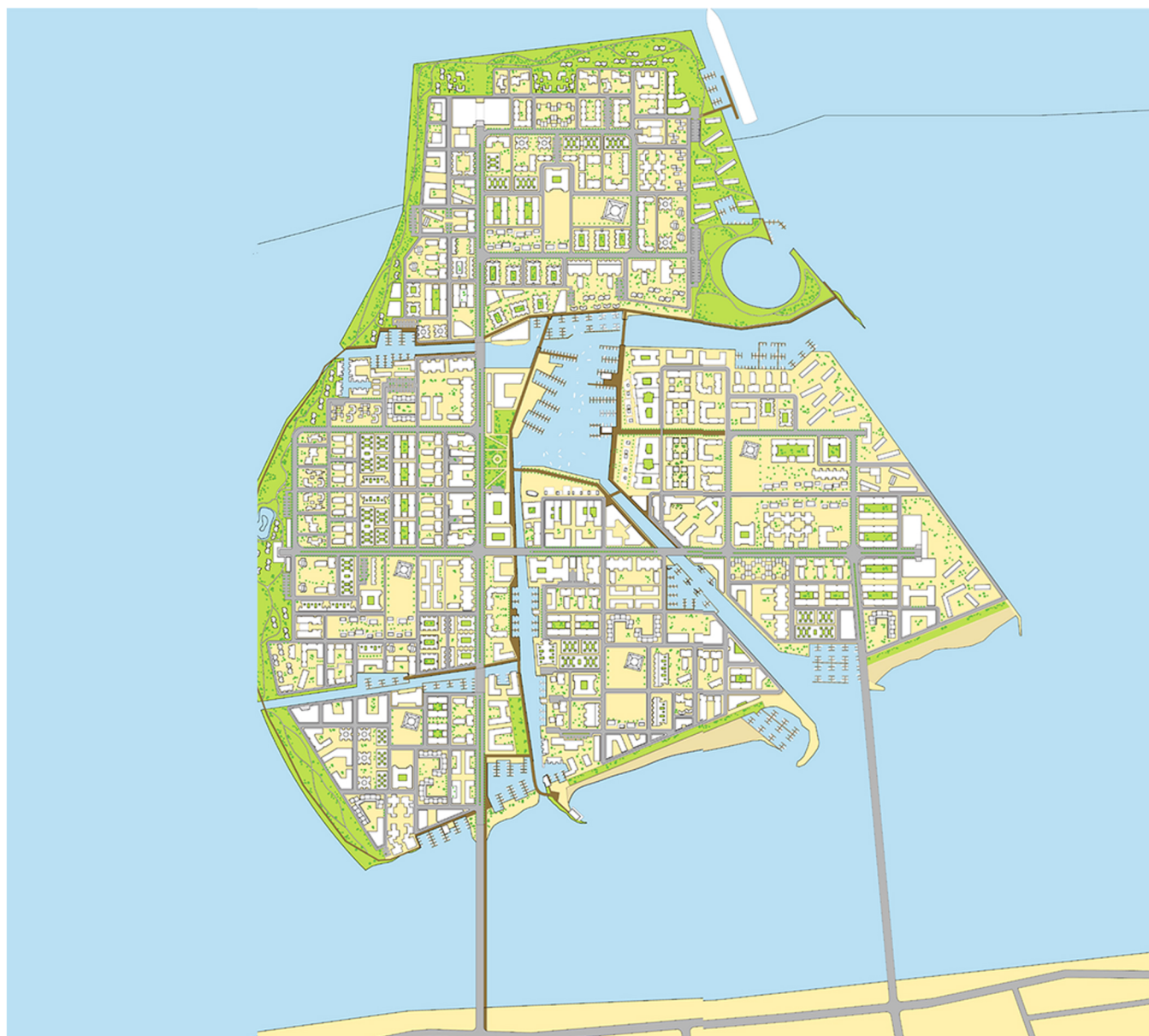
5 Linear Island with Port, Gaza

- 1 Public Plaza, high-rise towers, commercial boulevard
- 2 Mosque and community services
- 3 Landscaped commercial street
- 4 Early urban fabric study: high rise and low rise housing and relationship to water's edge.



6. Marina Cove Islands near Wadi, Gaza

Amy Hutchins
Jeffrey Massey
Kevin Morin

**6****Marina Cove Islands,
near Wadi, Gaza**

New Land reclaimed:

2.1 km².8 mi²

Probable population:

40,000 inhabitants

8,000 units

6 Marina Cove Islands near Wadi, Gaza

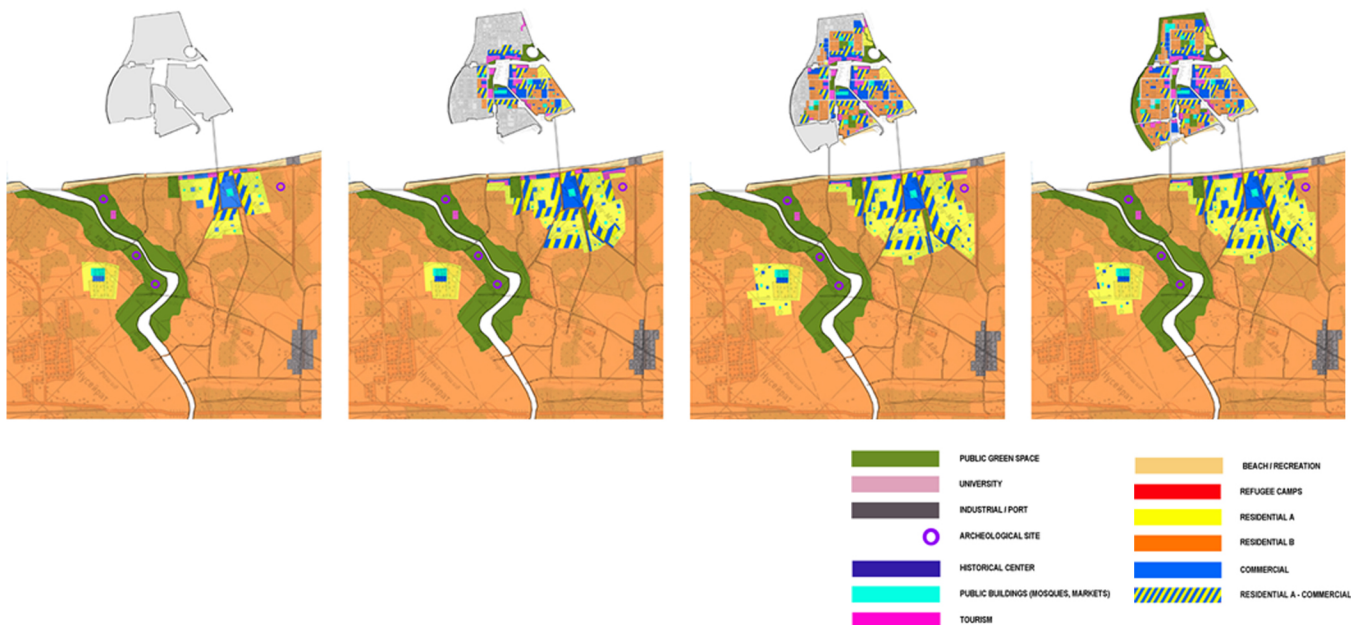
This scheme creates a series of Islands off the coast of Gaza which has services that are meant to attract tourists and corporate businesses. Connected to a new deep sea port, the Islands and their financial success will invite growth to the existing urban center on the mainland. These new facilities should revitalize and expand planned light industry zones and its residential growth toward existing river and wetland preserves, south of Gaza. The proposed plan shows higher income, low rise housing, surrounding a special Island Town Center with hotels and other tourist facilities including special marinas for Mediterranean yachts and sail boats.

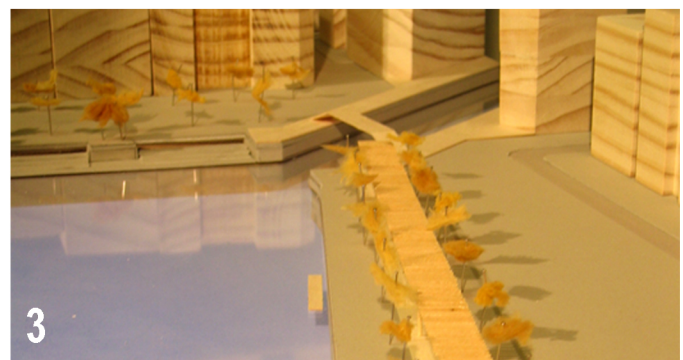
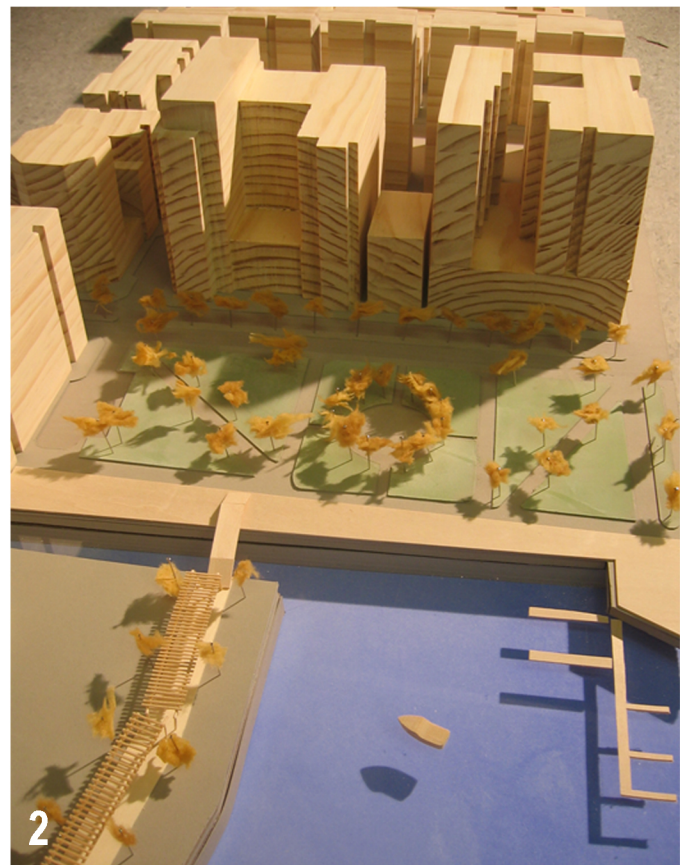
Separated into distinct neighborhoods, local shopping, schools and religious and other cultural facilities are within walking distances. The cargo and port facilities, invite shipping from throughout the Mediterranean with international distribution of assembled and manufactured goods from within the existing Gaza Strip perimeter.

This design approach is a conscious attempt to build on existing services, protecting existing agricultural land and the environmental and utilize mainland amenities and infrastructure. This growth and mainland growth is anticipated over long time frame.



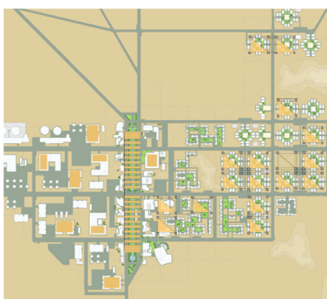
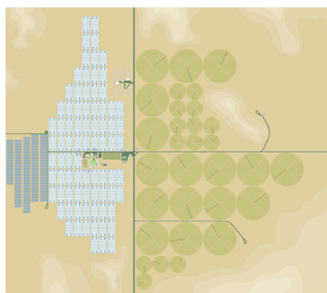
New Land reclaimed:
2.1 km²
.8 mi²
Probable population:
40,000 inhabitants
8,000 units





6 Marina Cove Islands near Wadi, Gaza

- 1 Public green space
- 2 Hotels and marina park
- 3 Shaded trellis walkway
- 4 Early urban fabric study



7. Desert Settlements/Desert City

Keith Boyle
Micheal Cortese
Matthew Fallows
Nicholaus Lupi
Brian Troie

**7****Desert Settlement,
Israel**

Probable population:
400 inhabitants
80 units

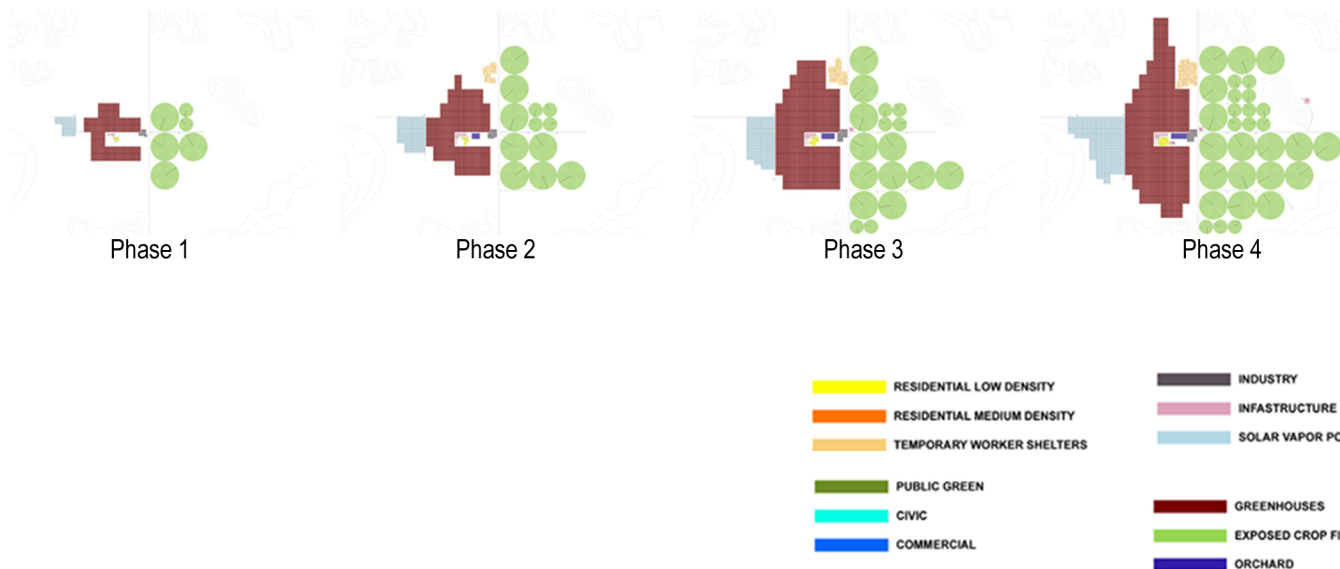
7 Desert Settlement, Israel

With the abundance of land in the Negev Desert that is currently unused because of adverse and severe climate conditions, this study investigates agricultural based Settlements with small Desert Cities east of the coast within the Negev Desert. As sites for human habitation, this region has an overabundance of sun and an absence of water. No rain is received. Power is non-existent. Small Desert Settlements with sustainable land management, greenhouse construction, drip irrigation, vertical planting concepts, seasonal crops are anticipated.

Agricultural innovation is the rule not the exception. With water wells in deep brackish aquifers, water sources can be developed. Farms with saline tolerant crops like "salt water" tomato, broccoli, beet and other vegetables provide sources of food or export. Flowers can grow for shipping to other countries. Fig trees, olive groves are possible. Fish farms, shrimp, prosper. Water condensation techniques produce higher quality water; more expensive desalinization water supplies from the coast are considered. The ultimate goal is to provide food, and jobs and land to develop and live on.



Probable population:
400 inhabitants
80 units

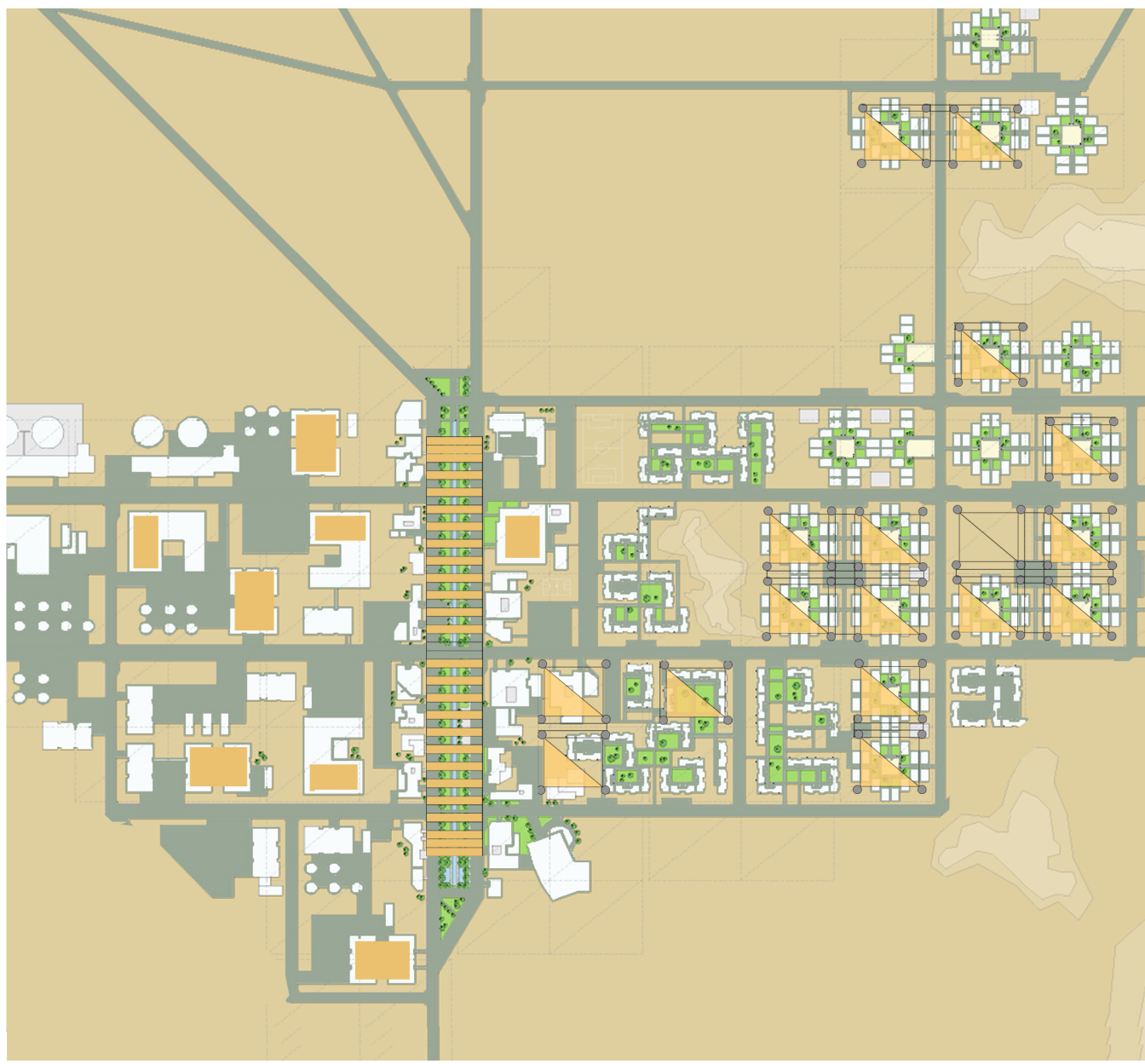




7

Desert Settlement, Israel

- 1 Aerial view, housing and storage facilities
- 2 Processing buildings, greenhouses, and silos
- 3 Settlement community

**7****Desert City,
Israel**

Probable population:
25,000 inhabitants
5,000 units

7 Desert City, Israel

Desert City results from the services to and from the many anticipated settlements and demands from coastal centers. Both processing plants and manufacturing provide jobs for residents. Desert research facilities would prosper. Relocated refugees and immigrants to the Middle East could find homes and jobs here.

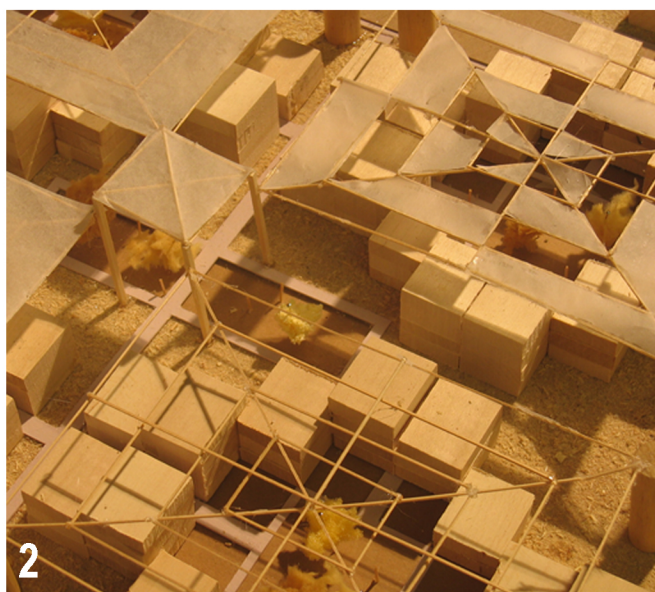
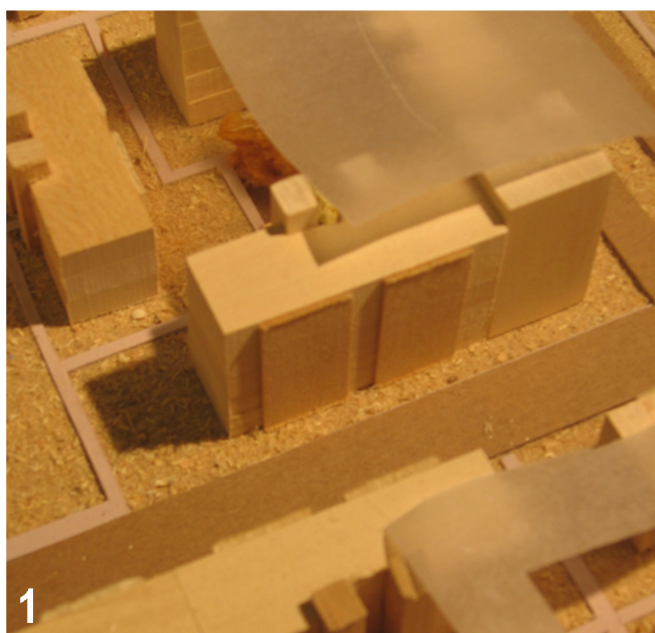
With temperature averages at about 97 degrees in summer, large lightweight translucent shading provides a cooler environment for the people below. Deep geothermal cooling is investigated for special building types. Photovoltaic arrays provide power from the sun. A shaded center with schools and cultural facilities serve low rise, low density housing neighborhoods with shaded courtyards.

Occasionally discussed in political negotiations as potential land trade between Palestinians and Israelis, this new desert land reclamation suggests positive potential.



Probable population:
25,000 inhabitants
5,000 units





7 Desert City, Israel

- 1 Processing plant with roof shading
- 2 Lightweight translucent suspended shading with stainless steel support system
- 3 Low-rise housing neighborhood with suspended shading and water collection tanks

Appendices

Conditions and Standards

Climate

Power Generation

Cargo Shipping

Airport Facilities

Water

Conditions and Standards

- * A basic strategy for all designs is to create, through various kinds of land reclamation, business development , creation of employment opportunity for workers, reducing unemployment, raising per capita income, increasing security and an improved standard of living for the people of the region.
- * These schemes assume the relocation of Israelis from within the Gaza Strip and from the West Bank Settlements as proposed in various peace initiatives.
- * Immigration to Palestine and Israel from outside the Middle East will continue.
- * Housing needs for Palestinians for the next ten years will be +/- 260000. (UN Governing Council of the United Nations Human Settlements Programme)
- * Population figures included in the various schemes assume 5 members per unit of housing
- * Average size of a housing unit is targeted at 80 square meters

Social / Economic / Political / Geographic Design Strategies

Existing Conditions		Design Directions
* High unemployment, Low income / capita, shortage of Land, existing intensive land use with higher densities, high birthrate / continued immigration into the region, with security needs	=	increased employment, higher income, Island creation of Land with off shore development with land connections with existing infrastructure improvements
* High unemployment, Low income per capita, an abundance of undeveloped land, low density of use with little development. Security requirements included.	=	increased employment, higher income, economic development, improvements to existing infrastructure Harbor and port services offshore in secure Arab environment
* Low unemployment, higher standard of living, immigration into the region with internal refugee needs, high density and heavy land use; security needs	=	increase land development which serves higher income families with more recreation / tourist services, more specialized housing. New land development offshore
* High unemployment, lower standard of living, immigration into the region, population increases, = abundance of land, with little current use, little existing development because of severe climate conditions	=	Reclaim land , construct new infrastructure, expand scientific research, development of existing land for growing food and creating economic development.

Climatic and Environmental Concerns

The Gaza Strip is located in a transitional zone between the arid desert climate of the Sinai Peninsula and the temperate and semi-humid Mediterranean climate along the coast. The average daily mean temperature ranges from 25 degrees C in summer to 13 degrees C in winter.

The rainy season extends from October to early May and rainfall peaks in the period between the months of December thru February. The average mean rainfall on the Gaza strip amounts to about 400mm. Rain in the Negev Desert is negligible.

Wind is constant, coming primarily from the SW during the spring and summer and during the winter months from the W-NW across the Mediterranean.

Architectural responses to environmental conditions are many. They include the creation of shade in many forms (roof overhangs and shades are the simplest), photovoltaic arrays for hot water, wind towers for ventilation, high windows for ventilation from high ceilings, small apertures in building walls on the south and south west sides of buildings, wood screens and grills to allow air to pass but eliminate sun and privacy issues, use of light colored materials to create more heat reflectivity, porticos, thick wall construction to reduce heat transfer to the interior of buildings, insulated roofs, moisture producing elements in public and private spaces. More technical and experimental methods of cooling include geothermal systems using heat exchangers to provide special building cooling where necessary.

Higher urban densities create building shadows and shade and more comfortable spaces for people. In low rise housing the use of ground floor walled courts, courtyards, and walled roof spaces do the same.

Site consideration responses include the use of pervious surfaces to allow water to pass directly to underground aquifers, pervious driving surfaces, the capture of rain water for direct use, spot irrigation systems and selected plants for minimum water use, selection and planting of trees for shade and cooling. Waste treatment plants would continue to recycle water for secondary and additional uses.

Power Generation

All power for these projects assumes a self sufficient direction for what is proposed and ultimately created. The major power sources include photovoltaic arrays for electrical power from the sun. It includes proposals using wind turbine farms off the coast in the Mediterranean. Geothermal cooling from the sea is considered where buildings need special cooling.

Power reduction strategies would be a common theme for these new structures. With natural cooling created by air movement through buildings, the requirement for power is reduced and power conservation achieved. The methods listed in Climate and Environmental Response would produce more sustainable environment which uses natural elements to help create a more positive and comfortable living experience. These methods are proposed to conserve power.



Architectural Responses to Climate

C. Hagenah

1. Flexible bays of manufacturing, assembly and office space.
2. Buildings respond to Sun through both active and passive building technologies
3. Road Systems



Architectural Responses to Climate

C. Hagenah

1. Shaded interior courtyard
2. Sunshading devices
3. Wood Privacy Partitions- Operable for ventilation
4. Public Roof Use
5. Landscaped community spaces



Architectural Responses to Power Generation

1. Photovoltaic Arrays
2. Manufacturing Plants
3. Focused Landscaping Program
4. Sun Shading Devices

Shipping Facility

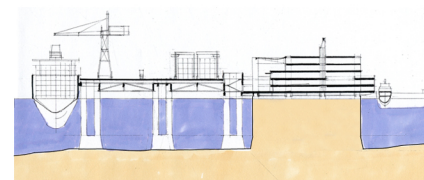
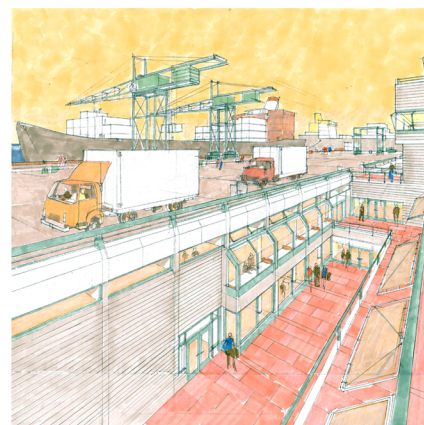
An integral part of most of these land reclamation or land creation proposals involve the design and construction of harbor facilities. Located on the edge of the Mediterranean with direct access to the economics of Europe, the economic and job creation returns of this direction, appear clear.

Deep harbor container ships services require a depth of 20 meters. This depth is achievable at various distances from the coast.

With approval time and construction scheduling related to peace initiatives, various construction options may be possible. Prefabricated “floating” harbor facilities, moved from other manufacturing centers outside the region, may serve as a first phase “seed” to allow other economic responses to follow.

With an overview of international agreements, investment strategies, and political realities, constructing these services may include distances of three miles from existing coastlines in international waters.

Custom in design and function, it is conceivable that the these structures served by ferry service, could include multilevel fabrication and /or assembly jobs within 5 years. Future expansion of the concept would include causeway connection for trucking.



Containerized Port Facility

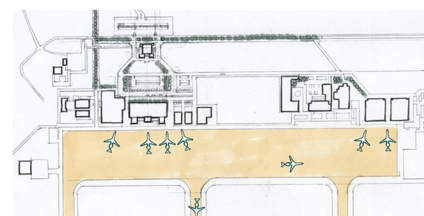
C. Hagenah

Airport Facilities

The existing airport constructed south of Rafah in the Gaza Strip does not operate at this time. It was removed by Israel in 2002. Some of the infrastructure is possible to reconstruct. The reactivation of a close airport facility would be beneficial to an improved economy related to a number of proposals within the Gaza Strip or the design proposals south of the Gaza Strip border in Egypt.

A report has been prepared independently by Marion White, Architect and Airport planner for HOK International Limited which is available for review elsewhere. Briefly, with reconstruction and upgrading, the existing single runway footprint and adjacent parallel taxiway will support a variety of contemporary widebody aircraft including B727s and B737s and handle an annual passenger count of 7.3 million assuming 400 aircraft movements / day with 50 passengers / flight. Four gates would be provided.

Other required services that would include construction of a Flight Operations Tower, fire and rescue facility, aircraft maintenance facilities, cargo/mail/storage facilities, passenger terminal buildings with parking and road infrastructures. Planning that would relate to many of the proposed land reclamation or land creation proposals, would suggest that additional airport related businesses, as well as fabrication and manufacturing facilities would be integrated into the reconstruction of the new Gaza International Airport.



Renovation of Existing Airport

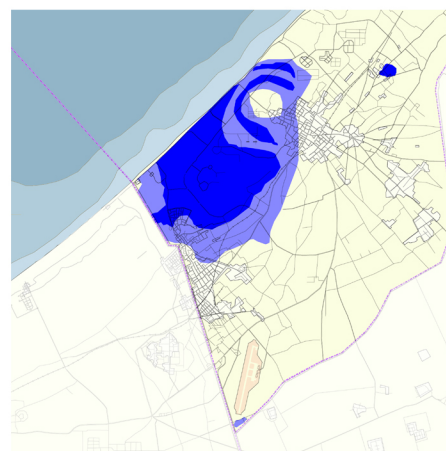
C. Hagenah

Water

Water is a precious commodity in Israel, the Gaza Strip and the West Bank. About two-thirds of the existing fresh water supply comes from reservoirs in the North. The main underground distribution system is the National Water Carrier that runs from the North to the South providing water to cities and settlements along the way. Supplemental water supply is provided from treated wastewater, brackish water and water harvesting (collection, storage and storm runoff).

The existing water supply is dwindling with estimates by some that Israel will face a major water crisis by 2012 (footnote 1). A major potential source of water exists below the Negev Desert. This desert, which comprises 60 % of Israeli territory with only 7 % of its population has below it a huge aquifer. The water itself is brackish, somewhat salty (4 grams / cubic meter; sea water has 35 grams of salt / cubic meter) but can be and is used for special crops and special industries. De-ionization of brackish water is less expensive by 1/3 than desalinization of sea water. Forty desalinization units have been erected over the past few decades. Of these 23 treat brackish water by reverse osmosis on a commercial basis (footnote 2).

Additional issues with water use and distribution exist. Increasing salinity in the ground water in Gaza City is of concern. Only 70 % of units are connected to the sewage network (footnote 3). The preservation and supplementing of water sources for the Gaza strip is particularly acute. The primary cause of deterioration of water quality in Gaza include: sea water encroachment, excessive use of fertilizers and pesticides and apparent infiltration of treated sewage and agricultural drainage into the water system. The shallow water table often exists less than 2m below the surface depleting fresh water by the incursion of sea water.



Existing Water Considerations

Below the south Gaza Strip, aquifer supplies provide various water qualities from potable to that which would require treatment. Developed urbanization above ground should protect this rare resource.

Legend

- Grade 1: Potable water, High grade water
- Grade 2: Secondary quality
- Grade 3: Requires treatment

Notes and References:

1. Ben Gurion University water expert Adar questions JNF plans for surface reservoirs
2. Israel ministry of Foreign Affairs, principal water sources, Aug, 1994
3. Governing Council of the United Nations Human Settlements Programme